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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| Applicant.: Chen et al. |) Examiner: Not Yet Assigned |
| |) |
| Serial No.: Not Yet Assigned |) Art Unit: Not Yet Assigned |
| |) |
| Filed: On Even Date Herewith |) |
| |) |
| Title: DIRECT, NON-DESTRUCTIVE |) |
| MEASUREMENT OF RECESS |) |
| DEPTH IN A WAFER |) |

jc979 U.S. PTO
09/965093
09/28/01

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97 AND 1.98

Honorable Commissioner of Patents and Trademarks
Box Patent Applications
Washington, D.C. 20231

Sir:

It is respectfully requested that the citations listed below be considered by the Patent and Trademark Office and made of official record in the above-identified application.

In the opinion of the undersigned, the below-listed citations represents the closest art known to the undersigned during the preparation of the above-identified application. This citation may be material to the examination of the subject application and is therefore submitted in compliance with the duty of disclosure defined in 37 C.F.R. § 1.56 and 1.97.

A concise explanation of the relevance of the pertinent listed citations are set forth below.

CONCISE EXPLANATION OF THE RELEVANCE OF THE PERTINENT
LISTED CITATIONS

U.S. Patent 6,275,297 is deemed pertinent for its disclosure of a methods of and apparatus for measuring the depth of structures on a semiconductor substrate. The measurement is accomplished by a broadband light source that irradiates the recessed and non-recessed portions. A detector detects reflected light including a first spectral component comprising light reflected from the recessed portions and a second spectral component comprising light reflected from the non-recessed portions, wherein at least one of the first and second components further comprises a third component comprising light reflected from the dielectric layer. Spectral reflectance information of the detected rays is stored and a plot of reflectance intensity versus wavelength is generated. Depth geometries of the recesses and the dielectric layer are determined relative to the at least one reference interface based on an interferometric analysis of the plot.

U.S. Patent 5,691,540 is deemed pertinent for its disclosure of an assembly for measuring a trench depth parameter in a work-piece. The assembly comprises an ultra-violet radiation source; a split fiber bundle having a first branch for propagating the ultra-violet radiation from the radiation source to a lens, and a second branch; a lens for focusing the UV radiation to the workpiece and refocusing an ultra-violet interference signal to the second branch; and a detector responsive to the ultra-violet interference signal received through the second branch. The

detector transforms the ultra-violet interference signal to an electrical signal which is a measure of a trench depth of the workpiece. The ultra-violet interference signal is developed when ultra-violet radiation propagates through the workpiece and reflects from its base region to thereby interfere with ultra-violet radiation that is directly reflected by a workpiece surface which is different from the base region.

U.S. Patent 6,124,141 is deemed pertinent for its disclosure of a non-destructive method for measuring the depth at which the top surface of a buried interface is located in a semiconductor substrate. The method employs a Fourier Transform Infrared measurement, and comprises subjecting the semiconductor substrate containing the buried interface to a beam of infrared light and then detecting and analyzing the spectrum of a return signal by a Fourier analysis. The spectrum as analyzed by the Fourier analysis is then compared to calibration spectra to thereby determine the depth of the top surface of the buried interface. The invention also uses a device for determining the depth of a buried interface below the surface of a semiconductor substrate. That device comprises a FTIR spectrophotometer which illuminates the substrate with a source of infrared radiation and which produces a Fourier transform of a return signal reflected from the substrate. The device includes a library of stored calibration spectra, along with means for comparing the Fourier transform return signal to the calibration spectra to determine the depth of the buried interface.

U.S. Patent 4,840,487 is deemed pertinent for its disclosure of an apparatus for measuring etching pits by employing a light source having a small absorptivity with respect to a groove or pit as an object of irradiation to insure a satisfactory change in the interference intensity of the defracted light which is reflected from the object. The apparatus includes a detector

means provided with the freedom of movement in two axial directions which are perpendicular to each other and in the direction of rotation. In addition, as a laser source, a He-Cd, N₂ or Ar laser may be employed in addition to a He-Ne laser to detect changes in their interference intensities, and the etch depth is calculated on the basis of the detected changes.

This Disclosure Statement under 37 C.F.R. § 1.56 and 1.97 is not construed to the effect that no other material information as defined in 37 C.F.R. § 1.56(c) exist, or that this citation constitutes prior art under U.S.C. § 102 and 103.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Jerome J. Norris", is written over a horizontal line.

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